UNITED STATES PATENT APPLICATION

FOR

CONTROLLED ACCESS TO IMAGE METADATA

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CONTROLLED ACCESS TO IMAGE METADATA

FIELD OF THE INVENTION

The present invention relates to digital image metadata, and more particularly to method and system for controlling which sets of image metadata are accessible to a user.

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BACKGROUND OF THE INVENTION

One advantage of digital cameras over film based cameras is that digital cameras have the ability to associate metadata with a captured image that may later be accessed by a viewer. For example, once the digital image has been

10 transferred from the digital camera to a PC and displayed, a user may also view information about the image, such as date and time of capture, the name of the image, and image size, for instance. Metadata may be either stored with the image or stored separately in a separate database. If the metadata is stored with the image, then the metadata is typically stored as tags within the image file of the

15 captured image.

For example, a standards organization referred to as the Digital Imaging Group (DIG) has developed a DIG35 Metadata Specification that provides a set of metadata definitions to the imaging industry. The DIG35 metadata specification for describing elements of an image is independent of the imaging application or the

20 image file format used.

By associating metadata with digital images, every image that is uploaded to the Internet and shared with others around the globe may be its own stand-alone catalog record that can be used by each recipient for a variety of purposes.

Businesses, professionals and consumers can all utilize metadata in order to manage images. One example use of metadata is professional photographers associating information about camera settings, copyright information and image manipulation techniques within the image in order to recreate images and document their work. Additionally, metadata enables consumers to share their captured and experiences images by using metadata to tell the story or narration behind their images. For example, users may use image-editing software on their PC to add explanatory captions to each photo from their vacation, and then upload those photos to a photo-sharing website. Assuming the photo website was DIG35 compatible, the photo website would understand and save all the captions. Friends and family may then access the photo website and not only see the pictures, but read and/or hear the story and history behind each image by accessing the metadata.

The use of metadata with digital imaging provides users with the advantage of being able to access a wide variety of data regarding the image. When a user accesses the image, however, the user is typically shown all the metadata associated with that image. Access to the metadata is currently an all are nothing proposition when a user views the metadata via a photo-sharing site, or when the metadata is retrieved from an image file directly or from a database. Although each user of the metadata may have different interest and needs with respect to the

metadata, there is currently no control over what each user views, adds, or edits.

Accordingly, what is needed is an improved method for providing users access to digital image metadata. The present invention addresses such a need.

SUMMARY OF THE INVENTION

The present invention provides a method and system for controlling access to image metadata. The method and system include associating users who will access the image with roles, and associating the roles with individual metadata elements. In response to receiving a request for access to the metadata by a particular user, the user's role is determined from the request and the user's role is compared to the roles associated with the metadata elements to determine which metadata elements to make available to the user.

According to the system and method disclosed herein, different users of the metadata with different interest in the data will automatically be provided access to only the metadata that they need to view, add, or edit based on their assigned roles.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a block diagram illustrating one possible system environment for use with the present invention in accordance with a preferred embodiment.

FIG. 2 is a block diagram illustrating a diagram of one embodiment for an image file.

FIG. 3 is a diagram showing of one embodiment for the image tags.

FIG. 4 is a flow chart illustrating the process for assigning roles and access privileges to metadata elements in further detail.

FIG. 5 is a diagram illustrating an example set of metadata and roles assigned to the metadata for use in a real estate application.

FIG. 6 is a flow chart illustrating the process of determining whether to grant or deny a request for image metadata in one preferred embodiment.

DESCRIPTION OF THE INVENTION

The present invention relates to enabling the customization of tags within digital images captured with an image capture device. The following description is presented to enable one of ordinary skill in the art to make and use the invention and is provided in the context of a patent application and its requirements. Various modifications to the preferred embodiment will be readily apparent to those skilled in the art and the generic principles herein may be applied to other embodiments. For example, although the preferred embodiment explained in terms of a digital camera, one of ordinary skill in the art will readily recognize that any portable device capable of capturing images could be used, such as a cellphone or PDA equipped with a lens attachment, for instance. Thus, the present invention is not intended to be limited to the embodiments shown but is to be accorded the widest scope consistent with the principles and features described herein.

FIG. 1 is a block diagram illustrating one possible system environment for use with the present invention in accordance with a preferred embodiment. The system 10

includes one or more digital cameras 14 and an online photo-service site 16. The

digital cameras 14 capture digital images and store the images on an internal memory,

and have the capability of uploading the captured images to the online photo-service

site 16 either directly or via a PC. To upload the images directly from the cameras 14,

5   the cameras 14 may be provided with wireless connectivity for connecting to the

Internet, although a wired connection method may also be used. In one embodiment,

the cameras 14 may connect to the Internet via a service provider 26, which may

include a wireless carrier and/or an Internet service provider (ISP).

The online photo-service site 16 includes a gateway server 18 for receiving

10   the images and an image database 20 for storing the images. The photo-service

16 may include other servers besides the gateway server 18, but for simplicity, the

function of the other servers will be described as being performed by the gateway

server 18. Once the images are uploaded, the images may be stored in a user or

business account. The images and their metadata may then be viewed and

15   managed over the Internet by users 24 through a web browser or other software

application. Users may also access the images from the gateway server 18 directly

from the digital cameras 14 or other such portable electronic device.

FIG. 2 is a block diagram illustrating a diagram of one embodiment for an image

file 50. Image file 50 preferably includes a header 52, image data 54, a screennail 56,

20   a thumbnail 58, image tags 60, and an audio tag 62. Header 52 preferably includes

information that identifies and describes the various contents of image file 50. Image

data 54 contains actual captured image data, the resolution of which depends on the

settings of the camera 14. Image data 54 is typically stored in JPEG format, but may

exist in whichever format is appropriate for the current location of image file 50 within the image processing chain of the camera 110. Screennail 56 and thumbnail 58 are each different versions of image data 54 that have varying degrees of reduced resolution for a number of special viewing applications.

5   The metadata for the images is preferably stored within the image file 50 in individual image tags 60, each of which store various types of data that correspond and relate to particular captured image data 54. In a preferred embodiment, each image tag 60 may store an individual metadata data element or may store a metadata data structure, described further below. Audio tag 62 stores any sound that has been

10   recorded for the image.

Referring to FIG. 3, a diagram of one embodiment for the image tags 60 is shown for illustration. In the FIG. 3 embodiment, image tags 60 include system tags 64, and user tags 66. System tags 64 preferably include various types of camera information that preserve command settings at the moment of capture and

15   correlate with the captured image data 54. For example, system tags 64 may indicate focus setting, aperture setting, and other relevant information that may be used for effectively processing or analyzing the corresponding image data. The data written to the system tags 64 is controlled by the camera 14 and preferably cannot be modified by the user 24.

20   User tags 66, however, are provided to enable the storage of data that the user 24 enters on the camera 14 or that was populated by a software application. For example, a stamp tag may be provided for storing a label a user has entered on the camera to apply to a given image, such as "birthday" or "vacation". Thus, the

function of the stamp tag is to store label data.

The present invention provides an improved method for allowing users to access metadata associated with a digital image file 50. The process begins by defining metadata elements for an image file 50. Particular roles (e.g., job roles) are then associated with the individual metadata elements defined for the image, and each role is assigned certain access privileges for the metadata element to which they are associated, such as read, write, and modify. All users who will access the image are assigned particular roles. In one preferred embodiment, the users are identified by ID numbers, such as a user IDs, class IDs, and/or group IDs, and are then assigned roles based on their IDs.

After the metadata elements in the image file has been populated with data and stored on a server or other device, users may make requests from the server to access the image and its metadata. The user's role is then compared to the roles associated with the metadata elements in the image file to determine what metadata elements to make available to the user for reading, writing or modifying.

In accordance with the present invention, the roles and access privileges associated with the metadata are stored in the image file 50 as metadata that the gateway server 18 accesses to control access to the image as the image file 50. In an alternative embodiment, the roles and access privileges may be stored in a file separate from the image file 50 and transmitted along with the image file 50.

Although the software for implementing the present invention preferably resides on the gateway server 18, where users make request from the gateway server to view images from image database 20, the software may also be loaded

on individual PCs of the users, where the users transmit image files 50 to each other directly.

FIG. 4 is a flow chart illustrating the process for assigning roles and access privileges to metadata elements in further detail. The process begins by organizing an image file's metadata into individual elements, and labeling individual image tags 60 in the image file 50 with the name of the appropriate metadata element in step 100. Next, a list or table is then associated with each metadata element in step 102. The roles and access privileges are assigned as appropriate to each of the metadata elements and are added to the list corresponding to each metadata element in step 104. Each metadata element may comprise a variable or a data structure. The set of metadata elements defined for a particular type of image file 50 and the roles associated with the metadata are application-specific, as shown in FIG. 5.

FIG. 5 is a diagram illustrating an example set of metadata and roles assigned to the metadata for use in a real estate application. For the real estate application, the roles associated with an image might be "sellers agent", "buyers agent", "buyer", "seller", "appraiser", etc. The metadata elements 120 associated with the image might include the properties address, name of seller, sellers asking price, a list of bidders and their current bids, bidders credit ratings, seller's current mortgage information, the properties characteristics such as dimensions, amenities, and so on.

A list 124 is associated with each metadata element 120 or group of elements 120, which includes the roles 122 that are allowed to access that

metadata element 120 and the access privileges 126 defining what type of access allowed. For example, an appraiser would be allowed read access to property data, which characterizes the property: its address, dimensions, amenities, and other data related to valuation. The appraiser would be allowed to add the appraisal value to the metadata. An appraiser would not be allowed access to the seller's asking price or any of the bid information. The two agents may be allowed to see all the data.

After the metadata elements 120, the roles 122, and the access privileges 126 are defined for a particular type of image file 50, the image file 50 is used to store actual image data 54 and the metadata elements (tags 60) within image file 50 are populated with data. After that image file 50 containing the data has been stored, different users may make requests to access the image file 50 and its metadata.

FIG. 6 is a flow chart illustrating the process of determining whether to grant or deny a request for image metadata in one preferred embodiment. The user's request to access the image file 50 and its metadata is received in step 200. In a preferred embodiment, the request includes the user's ID and identifies the type of access desired. The user is then authenticated and assigned the appropriate role for the specific image requested based on the user ID in step 202. For each metadata element, the corresponding list is queried to determine if the list contains the user's assigned role in step 204. If the user's role is not found in the list, access to that metadata element is denied in step 206. If the user's role is found in a list, then it is determined if the type of access requested matches one of the access

privileges in the list defined for that role in step 208. If the type of access requested matches one of the access privileges in the list, then the data corresponding to the metadata element is returned to the user as requested in step 210. If the type of access requested does not match one of the access privileges in the list in step 208, then the request to access the image metadata is denied in step 206.

As an example, assume the user submitted a request to "view" the metadata associated with a particular image. If the role assigned to the user does not match the role assigned to any of the metadata elements, the user will not be allowed to view any of the metadata. If the role assigned to the user does match the role assigned to one of the metadata elements, but the access privileges assigned to that role for the element does not include the view privilege, the user will not be allowed to view the data for that element.

According to the system and method disclosed herein, different users of the metadata with different interest in the data will automatically be provided access to only the metadata that they need to view, add, or edit based on their assigned roles.

A method for controlling user access to image metadata has been disclosed. Although the present invention has been described in accordance with the embodiments shown, one of ordinary skill in the art will readily recognize that there could be variations to the embodiments and those variations would be within the spirit and scope of the present invention. Accordingly, many modifications may be made by one of ordinary skill in the art without departing from the spirit and scope of the appended claims.